

New Stony Corals (Scleractinia) from Northeastern New Zealand

By DONALD F. SQUIRES

Division of Marine Invertebrates
Smithsonian Institution
Washington 25, D.C.

Through Dr. A. W. B. Powell, Auckland Institute and Museum, I have been able to study the collection of corals made by him during the 1961 cruise of the New Zealand Marine Department vessel "Ikaterere" from the northeastern coast of New Zealand. Between East Cape and North Cape, in depths of less than 100 fathoms there is the richest coral fauna of any portion of the New Zealand shelf when considered either from diversity of kinds, abundance of specimens or frequency of catch. Despite the many trawling expeditions in this region over the years, new species continue to be taken. Although in large part this fauna is peculiar to the region, the current pattern and temperature range would indicate that this portion of the New Zealand shelf is the first to receive immigrants from more northern waters. It is at present impossible to suggest that some of the species represented are new arrivals, but it is to be hoped that as our knowledge of this most important faunal region increases, new arrivals may be detected.

With each new collection our knowledge of the biology of the characteristic coral of this region, *Kionotrochus*, increases. This little turbinoliid genus, not found elsewhere, is now suggested to reproduce at least in part, asexually by transverse fission from a fixed sexually produced parent stock. Although the specimens studied are dry, the evidence of the skeleton is sufficiently strong to indicate that attempts should be made to obtain living material for experimental studies of this very interesting reproductive process.

Given in the following listing are the pertinent station data and the species taken at these stations. One collection taken by H.M.N.Z.S. "Lachlan" off East Cape, housed in the Auckland Museum, is also recorded.

RECORD OF CORALS TAKEN IN 1961 "IKATERE" CRUISE

Station Number	Position	Depth in meters	Date	Species Taken
A 2	Across Tryphena Harbour Great Barrier Island.	24-25	27-4-61	<i>Culicia rubeola</i> , 3 fragments, dead and worn.
A-4	Between Tryphena Harbour and Cape Barrier, Great Barrier Island.	44	27-4-61	<i>Sphenotrochus ralphae</i> , n. sp. 15 + specimens alive (?)
A-5	Cape Barrier to Rosalie Bay, Great Barrier Island.	55-60	27-4-61	<i>Flabellum rubrum</i> , 1 immature, worn.
B-3	Southeast of Poor Knights Islands.	241	28-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , rare.
B-5	Between Mokohinau and Poor Knights Islands.	183	28-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , rare, broken coralla.
B-6	North of Poor Knights Islands	179	28-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , rare.
B-22	Off Whangamumu, 35° 12.2' S., 174° 36.2' E.	183	29-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , fragments.
B-23	Off Cape Brett Island, 35° 09' S., 174° 33' E.	192	29-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , rare; <i>Letepsammia</i> sp., fragments.
B-24	Off Cape Brett Island, 35° 07' S., 174° 29.2' E.	188	29-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , abundant.
B-25	Off Entrance to Bay of Islands, 35° 04' S., 174° 26.3' E.	208	29-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , abundant.
B-26	Off Entrance to Bay of Islands, 35° 04' S., 174° 23.2' E.	184	29-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , abundant. <i>Flabellum aotearoa</i> , n. sp., two alive. <i>Letepsammia</i> , n. sp., fragments.
B-27	Northeast of Cape Brett, 35° 06' S., 174° 21.3' E.	143-146	29-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , abundant; <i>Flabellum aotearoa</i> , n. sp., fragments; <i>Flabellum</i> sp., worn fragments; <i>Letepsammia</i> n. sp., fragments.
B-41	Northeast Bay of Islands, east of Cavalli Islands, 35° 01.1' S., 174° 13.5' E.	182	2-5-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , rare.
B-42	East of Cavalli Islands, 34° 59.3' E., 174° 10.2' E.	188	29-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , rare.
B-43	East of Cavalli Islands, 34° 57.1' S., 174° 07.2' E.	218	29-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , rare.
D-28	Bay of Islands, off north headland in Deep Water Cove	60	30-4-61	<i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , common.
D-33	Bay of Islands between Mos- quito Point and Moturua Island.	18	1-5-61	<i>Culicia rubeola</i> , dead and worn.
Rock	4.5 miles northeast of the Aldermen Islands.	102	5-61	<i>Ceratotrochus</i> (<i>Ceratotrochus</i>) <i>limatulus</i> , n. sp., 19 + specimens alive; <i>Flabellum rubrum</i> , 1 immature specimen.
H.M. N.Z.S. Lachlan	Off East Cape, 37° 39' E., 178° 34' E.	183+	10-5-61	<i>Letepsammia</i> , sp., fragments; <i>Kionotrochus</i> (<i>Kionotrochus</i>) <i>suteri</i> , common; <i>Flabellum</i> sp., fragments.

Family RHIZANGIIDAE d'Orbigny, 1851**Genus Culicia Dana, 1846*****Culicia rubeola* (Quoy and Gaimard, 1833).**

1962. *Culicia rubeola* (Quoy and Gaimard); Ralph and Squires, Zool. Publ. Victoria Univ. no. 29, p. 4, pl. 1, figs. 1-5.

Fragments of this common North Island littoral species occurred in samples from "Ikaterere" station D-33 at a depth of 18 m., and at Station A-2 at 24-25 m.

Family MICRABACIIDAE Vaughan, 1905**Genus *Letepsammia* Yabe and Eguchi, 1932*****Letepsammia* sp.**

1958. *Stephanophyllia formosissima* Moseley; Wells, B.A.N.Z. Antarctic Res. Exped. Repts. Ser. B. vol. 6, pt. 11, p. 263.

1962. *Stephanophyllia formosissima* Moseley; Ralph and Squires, Zool. Publ. Victoria Univ. No. 29, p. 16.

In 1958 J. W. Wells recorded a specimen in the British Museum (Natural History) reportedly collected from New Zealand. This record of micrabaciid corals from New Zealand was not substantiated until the "Ikaterere" collections were examined and fragments of coralla found at three stations. Additional fragmentary specimens were collected by the "Lachlan" from East Cape. None of the specimens are sufficiently well preserved to warrant illustration or description at present. There is, however, little doubt that they are conspecific or very closely related to the forms described from Australia by Wells (1958). Those and other specimens will be discussed in a forthcoming study of the micrabaciid corals. The erstwhile synonym of *Stephanophyllia*, *Letepsammia*, is utilised for the species, for *Stephanophyllia* should be restricted in its sense to corals conforming more closely to the type species, *S. elegans*.

The "Ikaterere" specimens are small fragments of coralla that appear to have been heavily preyed upon and show much regeneration from earlier damage. Most of them represent one sixth of the corallum, the weak points of the whole structure being the position of septa I.

Distribution: "Ikaterere" station B-23, off Cape Brett Island, 192 m. "Ikaterere" station B-26, off entrance to Bay of Islands, 184 m. "Ikaterere" station B-27 northeast of Cape Brett, 143-146 m. H.M.N.Z.S. "Lachlan," off East Cape, 183+m. Australia.

Family CARYOPHYLLIDAE GRAY, 1847**Subfamily Caryophyllinae Milne Edwards and Haime, 1857****Genus *Ceratotrochus* Milne Edwards and Haime, 1848*****Ceratotrochus (Ceratotrochus) limatulus* n. sp. Plate 1, Figs. 5-9**

Holotype: A specimen from the underside of a large flat rock (85 x 60 x 16 cm.) taken by the New Zealand Government Trawler "Ikaterere," 4.5 miles northeast of the Alderman Islands, New Zealand, from a depth of 102 metres. Collected by A. W. B. Powell, April, 1961. Holotype and 9 paratypes deposited in the Auckland Institute and Museum. Nine paratypes from the same locality deposited in the U.S. National Museum.

Description: Coralla are subcylindrical, moderately tall, attached by broad bases to a rock substrate. The wall is thick near the base, made massive by deposits of stereome. The wall is covered by low coarse granules often quite obscure. Costae are not well developed even near the upper margin of the corallum where the granules can be seen to be aligned approximately transversely so as to indicate low broad costae. The edge zone of the polyp is 5 to 10 mm. in length. Below the edge zone the granules become horizontally jointed to form very wavy, irregular and incomplete ridges. Septa are very slightly exsert, less than one mm. Septa I and II are about equal in size, and extend to the edge of the columella; their upper margin is smooth and evenly arched until they fall vertically into the fossa immediately adjacent to the columella. The proximal edges of these septa is sometimes slightly wavy; their lateral faces are ridged parallel to the leading edge and are very finely granular. Septa III are small, thinner, shorter and may be evenly interspersed about the corallum, or missing in some systems. Septa IV are very short and thin. The columella is massive, formed of tightly interlocking pleats, not discrete rods. Measurements of the holotype are:

Height	Maximum Diameter	Number of Septa	Size of Columella
14.7	6.95	48	1.8

Remarks: Several of the specimens show budding which superficially appears to be extratentacular but one specimen clearly indicates that intratentacular budding occurs in the species (figs. 5, 6). The linkage between the two corallites is trabecular.

Two subgenera of *Ceratotrochus* are recognised: *Ceratotrochus*, having a corallum with granulated or spinose costae; and *Conotrochus*, having an epithecate corallum (Vaughan and Wells, 1943; Wells, 1956). The present species lacks a definite epitheca, but possesses a wall which superficially suggests an epitheca. It is possible that dead and worn specimens or poorly preserved fossils in which the position of the edge zone could not be determined, and which have a wall similar to the present species have been misinterpreted. It is also possible that the distinction between the two subgenera is not significant; however, at the moment, there is not sufficient comparative material available to assess with confidence the relationships involved.

The new species is closest in skeletal morphology to (*Ceratotrochus*) *hiugaensis* Yabe and Eguchi 1942, from Japan. The wall of this species is nearly smooth, a feature which sets both species apart from other *Ceratotrochus* (*Ceratotrochus*), but the Japanese form is strongly conical and somewhat shorter than the New Zealand species. The difference in form may represent differing modes of life, for there is no stereome present on *C. (C.) hiugaensis* which might thicken the basal portion of corallum in the New Zealand specimens.

Wells (1958) discussed *Ceratotrochus* (*Conotrochus*) *typus* from Tasmania, and united seven species under the name. The result is a species having a cosmopolitan distribution through the Tertiary and modern seas. Lacking sufficient material upon which to base an opinion of Well's synonymy, it is accepted for the present time.

The specific name is derived from the Latin word *limatulus* meaning somewhat filed or polished.

Distribution: Known from only the type locality, 4.5 miles northeast of the Aldermen Islands, New Zealand: 102 metres.

Subfamily Turbinoliinae Milne Edwards and Haime, 1857

Genus *Sphenotrochus* Milne-Edwards and Haime, 1848

Sphenotrochus raphae n. sp. Plate 1, Figures 1-4

1939. *Sphenotrochus intermedius* (Münster) Gardiner, Discovery vol. 18, p. 333

1962. *Sphenotrochus* n. sp. B., Ralph and Squires, Zool. Publ. Victoria Univ. no. 29, p. 9 pl. 2 figs. 7, 8.

Holotype: A specimen from Station A—4, New Zealand Government Trawler "Ikaterē," between Tryphena Bay and Cape Barrier, Great Barrier Island, New Zealand, from a depth of 44 metres. Collected by A. W. B. Powell, April 27, 1961. Holotype deposited in the Auckland Institute and Museum. Other materials include 14 paratypes from the same locality deposited in the Auckland Museum and in the U.S. National Museum; Four additional specimens from N.Z.O.I. Station C 325.

Description: Corallum small and very compressed so that two large, nearly flat faces are formed which terminate laterally in end costae. The base of the corallum terminates in a sharp, tapering point. The angle formed by the lateral edges of the corallum is about 45°. Costae are well developed, those on the lateral ends of the corallum are complete to the base. Costae I extend to the base, while costae II arise slightly above I. Other costae arise by branching from lower cycle costae except that the branching positions may become obsolete causing the costae to appear as if arising by intercalation. Costae I are slightly swollen basally, thinning where the higher cycles appear. Costae are slightly broader than the interspaces, and are surmounted by one or more rows of low (?) granules. The lateral edges of the costae, which are raised high above the surface, are covered by minute spines. Septa I and II form a single group which are evenly exert about 1 mm. These septa are terminate proximally and are deeply notched before the columella. Septa III are evenly intercalated about the calice. Septa IV are accelerated in the systems adjacent to the lateral septa I. All septa are smooth on upper edge except proximally where they may bear several coarse granulations. The upper edge is thickened, caused in mature specimens by a concentration of minute granules. Septa III are thin, appearing to arise about the level of the upper edge of the columella. The columella is composed of four to seven stout vertical rods developing from the union of Septa I and II in the centre of the calice.

Measurements of the holotype are as follows:

Height	Maximum Diameter	Minimum Diameter	Septal Number
6.7	4.3	2.7	32

Remarks: Ralph and Squires (1962) discussed the affinities of this species, and further discussion is given in Squires (1961). Gardiner (1939) does not illustrate *S. intermedius* (Münster) and his description is sufficiently vague to permit any number of *Sphenotrochus* to be included therein. The specimens figured by Duncan (1873) as *S. intermedius* are not the same as the present species and appear, as indicated by Gardiner., to be closely allied to the Atlantic group of *S. auranticus*.

From Duncan's illustrations it would appear possible that more than one species is included in *S. intermedius*. The specimen illustrated on plate 41, figure 3, 4, 5 (Duncan, 1873), has a pointed base, highly exsert septa, and only two columella processes, all of which are characters separating it from the New Zealand species. The specimen illustrated on plate 41, figure 1 and 2 (Duncan, 1873), has a rounded base and coarsely granular septa, neither of which is found in *S. ralphae*, and which appear to separate it from the other specimen.

The species is named for Dr. Patricia M. Ralph, Department of Zoology, Victoria University, Wellington.

Distribution: "Ikatere" station A—4, between Tryphena Harbour and Cape Barrier, Great Barrier Island, 44 m. N.Z.O.I. Station C 325, off Manukau Harbour, 55 m. off Cape Barrier, Great Barrier Island, 55 m. (Ralph and Squires, 1962).

Genus *KIONOTROCHUS* Dennant, 1906

Kionotrochus (Kionotrochus) suteri Dennant, 1906. Plate 2, Figures 10-14

1906. *Kionotrochus (Kionotrochus) suteri* Dennant; Squires, Rec. Dom. Mus. vol. 3, pt. 4 pp. 283-288, figures 1-11.

1962. *Kionotrochus (Kionotrochus) suteri* Dennant; Ralph and Squires, Zool. Publ. Victoria Univ. no. 29, p. 8, pl. 2 figs. 5, 6.

This species has been adequately figured and described in the publications cited in the synonymy and need not be further treated descriptively here. Squires (1960) called attention to the similarity between young *Kionotrochus* and mature *Cylindrophyllia*, relating these two genera as subgenera by suggesting neotenic retention of the union between septa III and II in the latter, and because of the common tympaniform corallum. Materials from the "Ikatere" collection have shown that the similarity may go much further than then suspected.

At stations B—26, B—27, B—28 and the "Lachlan" East Cape Collection, were found short, tympaniform coralla attached to shell fragments. These forms are about the size of *Kionotrochus* and *Cylindrophyllia* (maximum observed diameter 2.5 mm.) and are short (about 1 mm. high) and have the general septal characters including three complete cycles with pali developed before septa II, laterally highly spinose septa, and a minor columella formed by the fusion of septa I. Coralla of smaller individuals are costate, the costae being simply spinose. Larger individuals, however, are epithecate, sometimes quite heavily, but all intermediate grades ranging from almost no epitheca to a heavy one are represented. Those specimens with the heaviest epitheca often have the heaviest, most massive septa as would be expected. The range in size, however, is not within expectable limits, but is smaller than is usual for such morphological variation. Polycyclic bases are common. Deposition of the epitheca is not even, but tends to be in thick bands separated by a region of thin epitheca through which the costae are apparent. As many as three of these bands can be seen in a vertical distance of one millimeter.

Turbinoliid corals completely invest their skeletons, building them both outside and inside. A typical *Kionotrochus* corallum has a flat base when young, but construction of the costae through time covers this

flat base and creates a pointed one with the costae extending to the very tip. The form of the mature corallum is not an indication then, of the habit of the young stages.

The morphological evidence of the cylindrical coralla indicates that they are the bases from which *Kionotrochus* buds because: 1. the septal pattern is identical with that on the base of small, immature *Kionotrochus*; 2. Diameters of the small *Kionotrochus* and the cylindrical coralla closely approximate each other; 3. the banding of the epitheca of the cylindrical stock suggests many episodes of regeneration; 4. There is not the size variation to be expected in a natural population. Transverse fission is not unknown among corals, and indeed is becoming more commonly recognised. Vaughan and Wells (1943) suggest that in addition to the hermatypic genus *Fungia* for which the process is well known, transverse fission occurs in *Flabellum*, *Placotrochus*, *Trochocyathus* and *Endopachys*. Rossi (1962) has described a unique transverse fission in a living *Sphenotrochus* from the Mediterranean.

That the process is not a simple parricidal budding in which the mother polyp dies is suggested by the aging of the trophozoid as indicated by increasing thickness of the septa and wall.

Final determination of the mode of budding must await the study of living or preserved materials.

Distribution: Very common along the northeast coast of New Zealand.

Family FLABELLIDAE Bourne, 1905

Genus FLABELLUM Lesson, 1831

Flabellum rubrum (Quoy and Gaimard), 1833.

1962. *Flabellum rubrum* (Quoy and Gaimard); Ralph and Squires, Zool. Publ. Victoria Univ. Wellington: 29, 13, pl. 5 figs. 1-18, pl. 6, figs. 1-9.

In addition to the reference cited above, I have prepared a comprehensive review of this species which is ready for publication by the New Zealand Oceanographic Institute. Only fragments referable to the species are found in the present collection. This is unusual, for *F. rubrum* is widely distributed over the northeast coast of New Zealand, although not generally in the depths from which most of the present collections came. Fragments probably referable to the species were taken on the rock slab described previously, while other fragments even less certainly identifiable were obtained from other stations.

Flabellum aotearoa, n. sp. Plate 2, Figures 15-18.

Holotype: A single specimen collected from Station B—26, New Zealand Government Trawler "Ikaterere", off the entrance to the Bay of Islands, northeast of Cape Brett, New Zealand, from a depth of 369 metres. Collected by A. W. B. Powell, April 29, 1961. Holotype deposited in the Auckland Museum.

Other materials include fragments from "Ikaterere" Station B—27, and two specimens from the Collections of the New Zealand Oceanographic Institute.

Description: The corallum is compact and ruggedly constructed. The lateral edges of the corallum form an angle in excess of 90° (ranging from 90° to 140°) but even the presence of a large crest on the lateral edges does not extend them to a horizontal position. The calicular margin is neither highly arched nor highly lacerate. Pedicel

short, oval in section, its longer diameter being in the plane of the long axis of the corallum. The wall is smooth and broadly ridged behind septa I and II. Brown to brownish purple bands are present on the walls and are arranged parallel to the upper margin of the wall. Vertical colouration of the wall is greatly reduced, although present behind septa I, II and III. The wall is not epithecate in the usual sense, being composed of fine granules arranged in rows approximating growth lines, but lacking the concentric rugosities of the normal "flabellid" wall. The upper edge of the wall is finely dentate, with lancelets formed by septa of the systems I and II and their adjacent septa V. Each lateral face bears five prominent lancelets, the sixth one being less well developed than the others. Septa are present in four complete cycles with portions of the fifth present in all coralla known. Septa I are the most exsert and the largest, arching outward from the wall to fall nearly vertically into the fossa. The proximal edge of these septa is only slightly thickened at depth in calice, but lateral granulation of the septa increases in density downward. Septa I in the lateral ends of the corallum are joined by the wall several millimetres from this distal end so that the distal portion extends beyond the wall as a crest. Septa of lower cycles are similar to septa I but are small and more lightly constructed. Septa II, III and IV are progressively shorter and appear in sequence. Pitting of the interior of the wall adjacent to the septa is very fine.

Measurements: (in millimetres):

	Height	Maximum Diameter	Minimum Diameter	Angle of Lateral Edges	Pedical Diameter
Holotype	19.6	30.45	17.5	122°	1.9
Paratype	15.2	22.2 (est.)	11.2 (est.)	104°	1.8
N.Z.O.I. C770 ..	11.7	19.0	9.4	114°	1.85
N.Z.O.I. C801 ..	13.5	22.7	13.6	114°	1.8

Remarks: This species belongs to the group of lacerate flabellids of the Indo-Pacific and North Atlantic Oceans. A revision of the Indo-Pacific species of this group is in progress and, as a result, discussion of the species is limited to comparative considerations. The present species is very closely related to an undescribed species widely distributed through the Philippine Islands and differs from it largely in the colouration of the corallum. The latter is a deep purple colour throughout and lacks the banding of *F. aotearoa*. Also, the corallum of *F. aotearoa* is more heavily constructed and the lacerations of the upper edge of its wall are not so pronounced. Both of these species differ from *Flabellum deludens* von Marenzeller and *Flabellum japonicum* Moseley. The first of these has a more highly lacerate upper calicular margin than *F. aotearoa*, while the latter is much rounder in calicular profile.

Two fossil species referable to this group have been described from New Zealand. Squires (1958) referred to *Flabellum deludens* and later (1962) described *Flabellum planus* from the Miocene of Kaipara. Neither of these species has any apparent ancestral relationship to *F. aotearoa*, suggesting that it is a post-Miocene (probably Holocene) immigrant. The first mentioned is a highly lacerate form with a very jagged calicular margin. The latter conforms more in form but has an extremely heavy wall which is present in all known specimens.

The specific name is the Maori word meaning "long white cloud," the name for New Zealand.

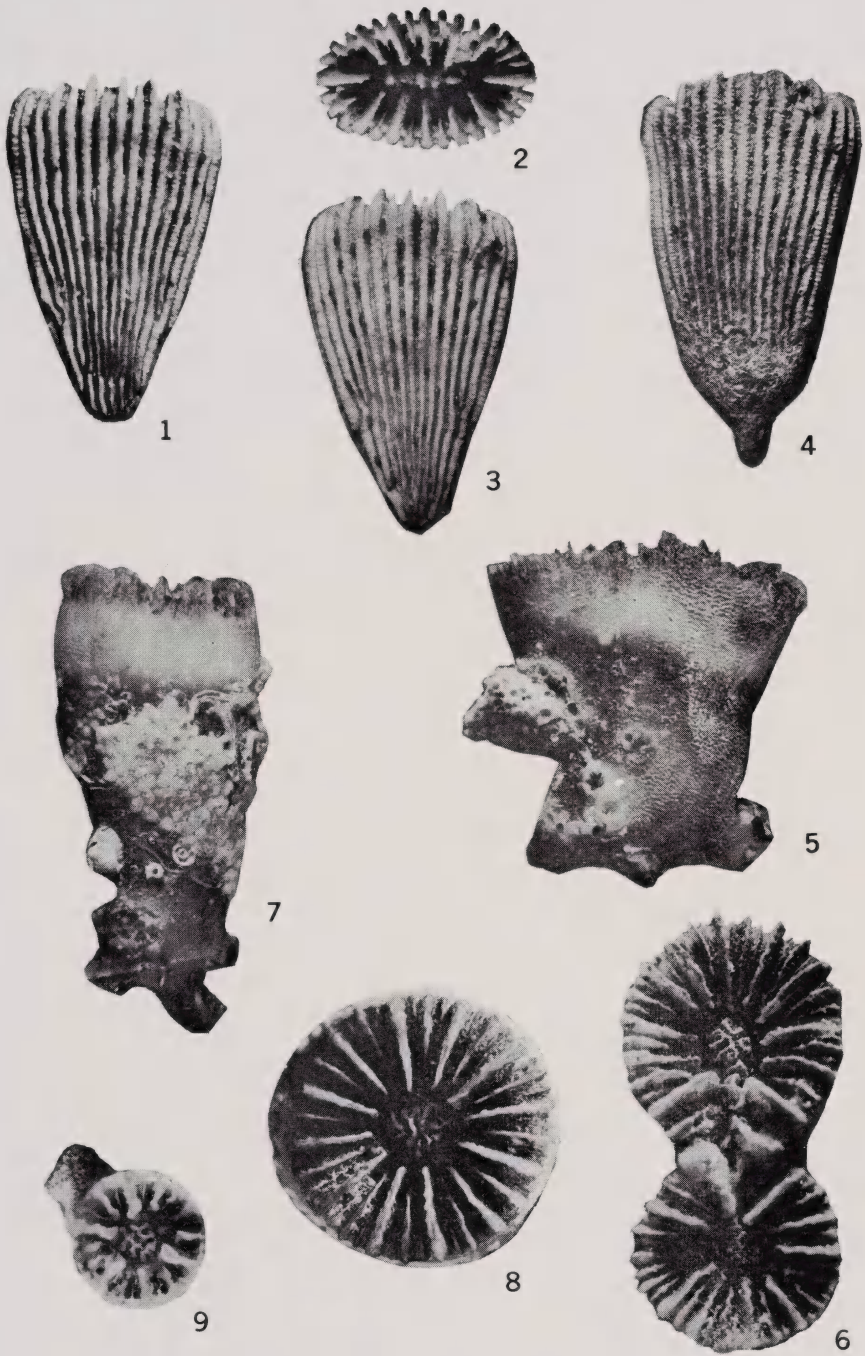
Distribution: "Ikatere" B 26—Off entrance to Bay of Islands; 369 m.
 "Ikatere" Station B 27—Northeast of Cape Brett; 143-146 m.
 N.Z.O.I. Station C 801—East of Coromandel Peninsula; 130 m.
 N.Z.O.I. Station C 770—Bay of Plenty; 130 m.

ACKNOWLEDGEMENTS

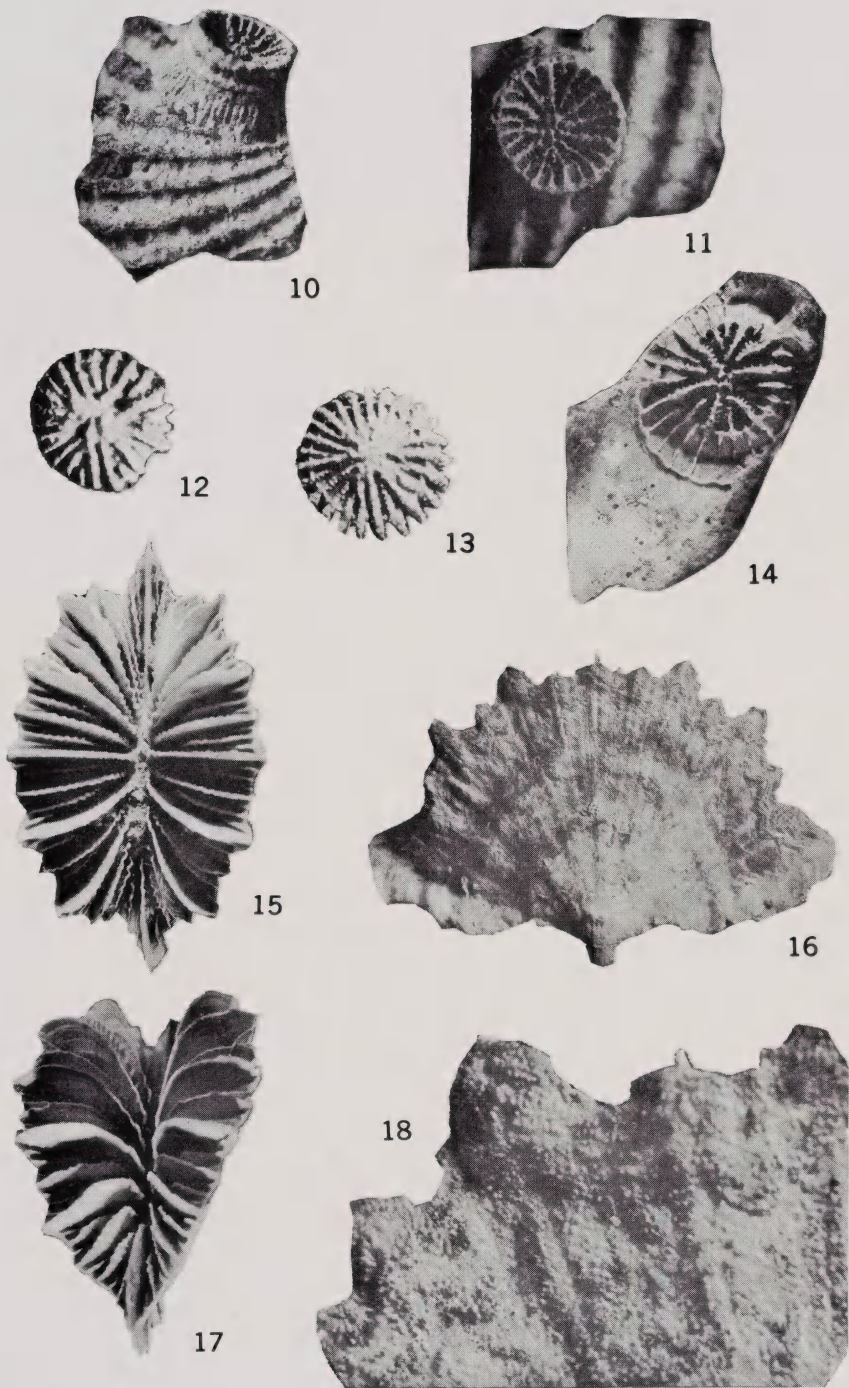
Completion of this study was facilitated by a grant from the National Science Foundation, GB-353. I wish to thank Dr. A. W. B. Powell for bringing the collection to my attention, and Mr. Ian Keyes for his aid in completing the manuscript.

REFERENCES

- DUNCAN, P. M., 1873. A description of the Madreporaria dredged up during the expeditions of H.M.S. "Porcupine" in 1869 and 1870. *Trans. Zool. Soc. London*, 8: 303-344, pls. 39-49.
- GARDINER, J. S., 1939. Madreporarian corals, with an account of variation in *Caryophyllia*. *Discovery Repts.*, 18: 323-38, pls. 20, 21.
- RALPH, P. M. and SQUIRES, D. F., 1962. The extant Scleractinian corals of New Zealand. *Zoology, Publ., Victoria Univ. Wellington*, 29: 19 pp., 8 pls.
- ROSSI, L., 1961. Morfologia e riproduzione vegetativa di un Madreporario nuovo per il Mediterraneo. *Boll. di Zoologia*, 28: 261-272, pls. 1, 2.
- SQUIRES, D. F., 1958. The Cretaceous and Tertiary corals of New Zealand. *N.Z. Geol. Surv. Paleont. Bull.* 29: 107 pp., 16 pls.
- , 1960. The Scleractinian genera *Kionotrochus* and *Cylindrophyllia*. *Rec. Dom. Mus.*, 3: 283-288, figs. 1-16.
- , 1961. Deep sea corals collected by the Lamont Geological Observatory, 2: Scotia Sea Corals. *American Museum Novitates* 2046: 48 pp., 31 figs.
- , 1962. Additional Cretaceous and Tertiary corals from New Zealand. *Trans. Roy. Soc. N.Z. (Geology)*, 1 (9): 133-150, 4 pls.
- VAUGHAN, T. W. and WELLS, J. W., 1943. Revision of the suborders, families and genera of the Scleractinia. *Geol. Soc. America Spec. Paper* 44: 363 pp., 51 pls.
- WELLS, J. W., 1956. Scleractinia in Moore, R.C. (Ed.) *Treatise on Invertebrate Paleontology*, Pt. F., Coelenterata. pp. 328-444.
- , 1958. Scleractinian Corals. *B.A.N.Z. Antarctic Res. Exped. Repts. Ser. B (Zoology and Botany)* 6 (11): 257-275, pls. 1, 2.
- YABE, H. and M. EGUCHI, 1942. Fossil and Recent simple corals from Japan. *Sci. Repts. Imp. Univ. Japan, ser. 2*, 22: 105-73.



Figures 1-4. *Sphenotrochus ralphae*, n. sp. (Figs. 1-3) Holotype, "Ikaterere" Stn. B-26, X 7.0 (Fig. 4) N.Z. Oceanographic Institute Stn. C325, X 6.6.
 Figures 5-9. *Ceratotrochus* (*Ceratotrochus*) *limatulus*, n. sp. (Figs. 5, 6), Paratype "Ikaterere" rock specimen, X 5.5. (Figs. 7, 8) Holotype, "Ikaterere" rock specimen, X 5.5. (Fig. 9) Paratype, "Ikaterere" Rock specimen, X 5.5.



Figures 10-14 *Kionotrochus* (*Kionotrochus*) *suteri*. Figs. 10, 11). Trophozoid (?), "Lachlan" East Cape collection, X 5.85. (Fig. 14) *ibid*, X 6.5. (Figs. 12, 13) base of young specimen, "Ikaterere" Stn. B-26, X 9.0. (Fig. 14) Trophozoid (?). "Lachlan" East Cape collection, X 6.5.

Figures 15-18 *Flabellum aotearoa*, n. sp. Holotype, "Ikaterere" Stn. B-26. (Figs. 15-17) X 2.0. (Fig. 18) X 10.0.